



THEMATIC INSIGHT

# Bitcoin and cryptocurrencies

The arrival of a new asset class?





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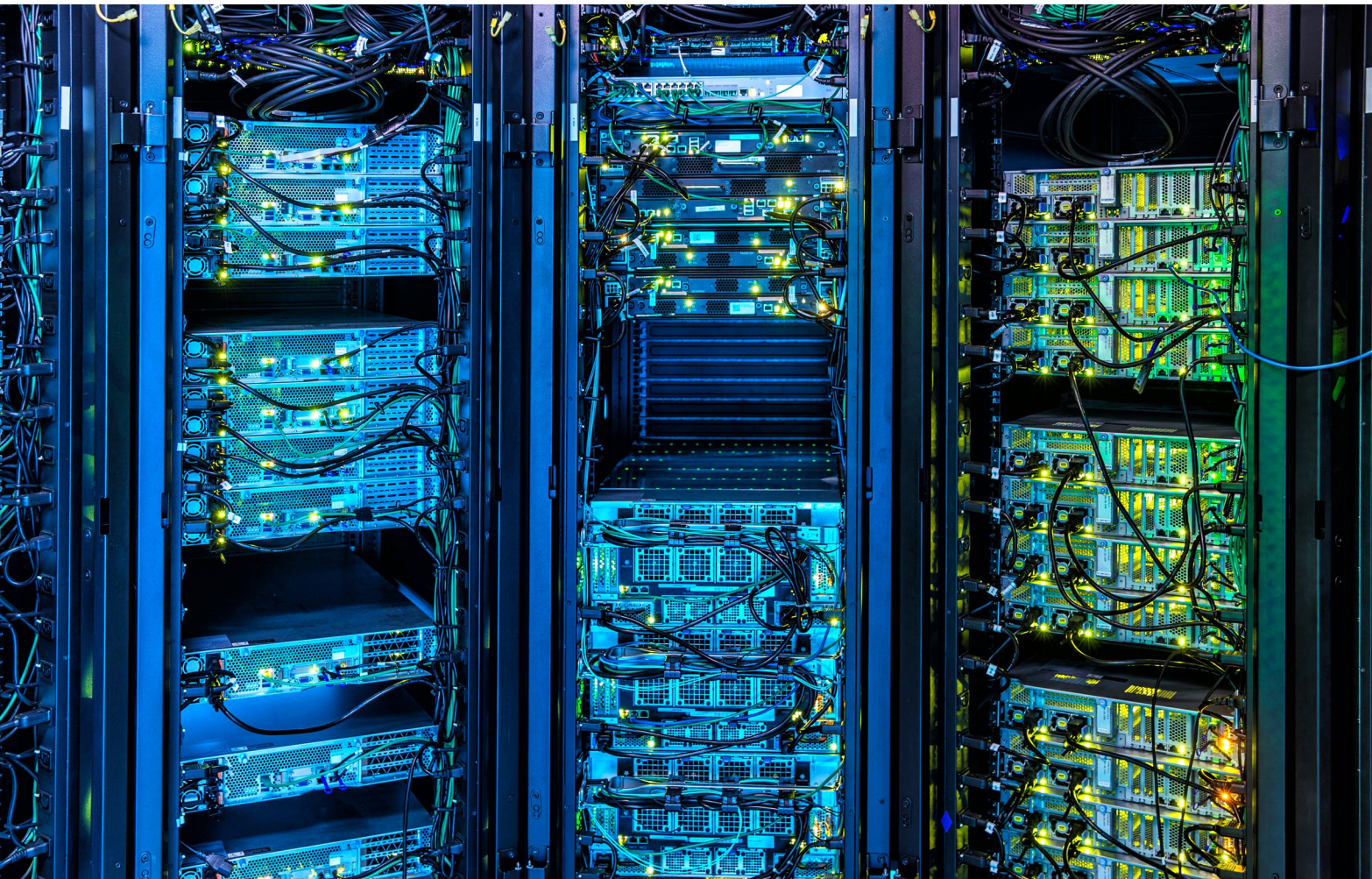
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# Introduction

The large-scale rapid growth of crypto-assets issued on public blockchains is well documented. Collectively these digital assets may form the backbone of new forms of economic coordination. Now, with much lower technical and financial barriers to entry, and highly transparent by construction, such crypto-networks appear to be facilitating a new set of opportunities that is challenging the status quo both in the financial system as well as in other economic sectors.



**Exhibit 1:**  
**Public Blockchains Have Unique Characteristics**

Status Quo Infrastructure		Public Blockchain Infrastructure	
Centralized	Central authorities control the infrastructure	Decentralized	Computer nodes in the network control the infrastructure
Closed-source	Innovation and governance take place behind closed doors at the discretion of companies, platforms, and regulators	Open-Source	Innovation and governance are distributed, open and auditable, coordinated by users and stakeholders
Corporate-Run	Corporations facilitate coordination, excluding users	Community-Run	Users on the network facilitate coordination
Permissioned	Geography and regulation control access to platforms	Permissionless	Anyone with an internet connection can participate and innovate

Source: ARK Invest

Public blockchains shift how a system distributes and quantifies “trust.” The familiar “active trust” mediated between institutions that relies on centralized authorities is replaced with automated protocols using decentralized, open-source software. These systems that aim to “minimize” (active) trust have the potential to significantly decrease the cost and improve the scalability of coordination by introducing an embedded, provably scarce unit of value within the system (“automated” trust) – a unit which aims to align network stakeholders’ interests.

The first and most basic application of this idea is with “independent” digital money, most prominently Bitcoin. Existing institutions coordinate the functions of the traditional financial system, but Bitcoin, by design, effectively operates as a single institution with a global network of peers to enforce rules.





# What is Bitcoin?

At its core, Bitcoin is free and open-source software (FOSS) code that exists on the Internet. Individuals can run the code. Or they can copy the code and create their own variant. The Bitcoin network is designed to be a complete financial system that facilitates the custody and transfer of bitcoin, a new digital asset.

Lowercase 'b' bitcoin, the asset, is a standardized unit of value embedded in the network. Its value acts as the signaling mechanism that aims to align network stakeholders. It is:

- » a digital bearer asset, similar to a commodity
- » scarce, divisible, portable, transferable and fungible
- » an asset that can be custodied with limited liability or counterparty risk.

Moreover, bitcoin's properties are native to the Bitcoin network. Within that network, the use of peer action to enforce the rules may presage a broader shift to a more automated and predictable global financial system. Bitcoin transactions do not rely on "active" trust, but must be transparently verified. In the absence of central enforcement, its integrity is a function of this openness and transparency.

# The Bitcoin Ecosystem

Traditional financial systems rely on centrally-controlled institutions that enforce the rules, record-keeping and adjudicate on the system. These institutions standardize the exchange of value, manage wealth and facilitate economic activity. For example, central banks govern monetary policy, while commercial banks custody and manage assets; and centralized payment processors mediate consumer transactions. Under this "trust-based" model, the integrity of an institution is a function of those who control it. Rules, enforced top-down, can be considered as "guaranteed" if those in control are deemed trustworthy. However, institutional decision-making is not always predictable. Rule changes remain ultimately at the discretion of those in control, which may create a misalignment of incentives between such an institution and system participants.

In contrast, Bitcoin demonstrates a model of a global monetary system controlled by individuals, rather than necessarily nation-states or supra-national bodies. According to ARK Invest, Bitcoin's current USD 1.1 trillion "market capitalization" - or network value - could scale to more than USD 28 trillion by 2030.<sup>1</sup>

<sup>1</sup> "ARK Big Ideas 2022" January 2022 and "On-Chain Data: A Framework to Evaluate Bitcoin," December 2021; ARK Invest



# A Potential Global Settlement Network

Bitcoin illustrates the potential for a crypto-network to become the basis of an alternative settlement system for banks and businesses. Unlike traditional systems, the Bitcoin network can be truly global; valid transactions cannot, in principle, be censored and its money is not directly inflated by external institutions like central banks. Instead of facilitating a large volume of low-value transactions at point of sale, Bitcoin could instead evolve to handle large transactions between and among financial intermediaries. Today, for example, most<sup>2</sup> dollar-based international payments must settle through the Federal Reserve’s Real Time Gross Settlement (RTGS), or Fedwire.

Accommodating both senders and receivers, the use of a network like Bitcoin would eliminate the need for an external intermediary to mediate and settle transactions. The network is capable of settling high-value transactions irrevocably every few hours. It could facilitate 2,400 global settling transactions roughly every ten minutes at any time. Expressed differently, the Bitcoin network could settle one transaction daily with every other bank in a global network of 850 banks.<sup>3</sup> In the United States alone, deposits totaling USD 14.7 trillion generate USD 1.3 quadrillion in settlement volumes between and among banks each year.<sup>4</sup> ARK Invest claims that if Bitcoin were to capture 25% of US Bank Settlement volumes at a similar deposit velocity, the network would scale to USD 3.8 trillion in value by 2030.<sup>5</sup>

2 <https://www.frb.services.org/resources/financial-services/wires/volume-value-stats/annual-stats.html>, <https://www.frb.services.org/financial-services/wires>

3 Economics of Bitcoin as a Settlement Network.” Saifedean Ammous, May 2017, Satoshi Nakamoto Institute. N banks have (N-1)\*(N/2) unique connections.

4 [https://www.swiftinstitute.org/wp-content/uploads/2012/10/The-Statistics-of-Payments\\_v15.pdf](https://www.swiftinstitute.org/wp-content/uploads/2012/10/The-Statistics-of-Payments_v15.pdf)

5 “ARK Big Ideas 2022” January 2022



# Protection against Asset Seizure

A central proposition of cryptocurrencies like Bitcoin is that they enable individual control. This is important for jurisdictions where investors may fear property rights will not be recognized or properly enforced. With good public and private key management, bitcoin’s ability to be seized is limited. ARK Invest suggests that one measure for a potential global investor allocation to a cryptocurrency like Bitcoin is the perceived aggregate probability that a government will confiscate assets or force a sale on unfavorable terms or otherwise devalue them during an individual’s lifetime. If that probability were 5% for HNWI wealth, then bitcoin’s network value, could increase by as much as USD 4.0 trillion by 2030.<sup>6</sup>

6 “ARK Big Ideas 2022” January 2022





## The Notion of Digital Gold

As part of the transition toward a digital economy, could bitcoin challenge traditional safe-haven assets like gold as a store of value? An asset may accrue value as the demand exceeds supply. Here, demand is likely a function of such an asset's ability to serve the three defining roles of money: store of value, medium of exchange and unit of account. Gold may have maintained its status as a store of value, but its limitations as a medium of exchange and unit of account began to surface in the 20th century.

Crypto enthusiasts have suggested that bitcoin may act as digital gold because it is scarce and durable; it is easily divisible and verifiable and clearly more portable and transferable than physical gold. ARK Invest estimates that for each 10% share of the physical gold market's role as an "asset of last resort" that bitcoin achieves by 2030, there is a corresponding increase in future network value of USD 1.1 trillion.<sup>7</sup>

<sup>7</sup> "ARK Big Ideas 2022," January 2022

## Currency Demonetization in Emerging Markets

During a surge in inflation, the delayed impact of monetary policy response typically encourages investors and savers to seek hedges to their existing holdings in cash and bonds. Historically, those diversifying allocations have included physical gold. Now investors are considering digital assets and cryptocurrencies like bitcoin. Cryptocurrencies, which are not subject to direct capital controls, could thus become attractive for savings in emerging markets in this context. They could even encourage businesses in extreme circumstances to require payment in bitcoin, say, instead of fiat. In that scenario, the devaluation of fiat currencies would accelerate further so that fiat-denominated debt would be less valuable and dollar-denominated bonds would become effectively unserviceable. Such potential demand for bitcoin and other cryptocurrencies in emerging markets will be better supported as its infrastructure reaches critical mass.

As a scenario, ARK posits that if bitcoin were to capture 10% of the global monetary base outside of the four largest fiat currencies—i.e., US dollar, yen, yuan, euro—its market cap could increase by USD 2.8 trillion.<sup>8</sup>

Taking such use cases together, ARK Invest estimates that the USD 1.1 trillion network capitalization seen today for BTC could increase to more than USD 28 trillion by 2030.<sup>9</sup>

<sup>8</sup> "ARK Big Ideas 2022," January 2022

<sup>9</sup> "ARK Big Ideas 2022," January 2022

# The Capital Allocation Debate

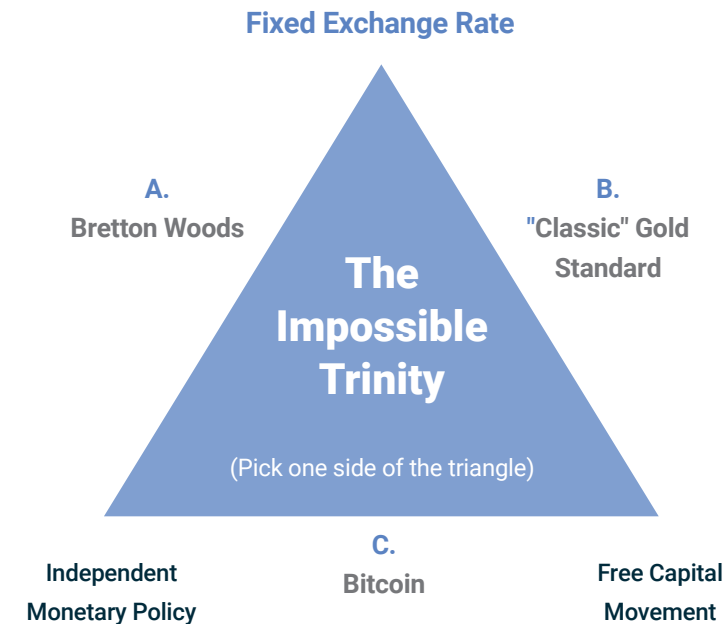
The volatility of cryptocurrencies like bitcoin is often raised as an apparent barrier to a major shift in crypto usage and to institutional capital allocations. Bitcoin advocates have argued, however, this volatility is a matter of design rather than a flaw.<sup>10</sup>

Each of the three sides of this “trilemma triangle” are mutually exclusive, that is, only one option is achievable at any given time. A monetary authority choosing to fix exchange rates and allow the free flow of capital, for example, cannot control growth in the supply of money. Likewise, one choosing to fix exchange rates and control money cannot accommodate the free flow of capital. Equally, and in contrast to fiat currency within the traditional banking system, the Bitcoin network does not prioritize exchange rate stability. Instead, it has a quantity rule by design that limits the growth of money supply (up to 21 million coins) while allowing the free flow of capital. As a result, bitcoin’s price is a transparent function of demand vs. supply, the latter only growing by 1.8% per year.<sup>11</sup>

The low-return correlation with conventional asset classes,<sup>12</sup> even in the presence of high volatility, has led to allocations to cryptocurrencies that improved the risk-return profile of a traditional multi-asset portfolio

**Exhibit 2:**  
**The “Impossible Trinity:” Exchange Rates, Monetary Policy and Capital**

Source: ARK Invest



in simulation studies.<sup>13</sup> If portfolio illiquidity is controlled, then the numerical allocation falls short of the applied constraint maximum (~0.5% with a 1% limit). But unconstrained, the allocations rise to 2-6%. Other research finds that, in the absence of lottery preferences, investors required an annualized expected return of at least 30% to support allocation to cryptocurrencies—a framing that is of interest to the institutional sector.<sup>14</sup>

# Beyond Bitcoin and The Monetary Revolution

While the Bitcoin protocol has created, perhaps, the most obvious application of public blockchain infrastructure, public blockchains are also triggering profound change in broader financial and internet services.

To accommodate functionality beyond that offered by Bitcoin, public blockchains such as Ethereum are designed to support more advanced transactions via “smart contracts”. Smart contracts allow for arbitrarily complex transaction logic to be executed via support for a native programming language.<sup>15</sup>

An early application of this smart contract technology was crowdfunding via a process known as the “Initial Coin Offering,” or ICO. In an ICO, developers launch a brand new cryptoasset, with its own embedded monetary policy and feature-set defined via a smart contract. These are built on top of an existing public blockchain, such as Ethereum, often to raise capital. Between 2017 and 2018, research estimated that ICOs raised USD 19 billion.<sup>16</sup> However, ICOs and smart contracts, have not been immune from risks such as bugs in developer code, regulatory scrutiny and other scandals.

Sophistication in smart contract development has continued to advance, increasing in functionality and complexity of services offered. Inspired by the ICO phenomenon, broader functionality is being deployed on public blockchains to promote the coordination of financial services and contracts outside the purview of traditional financial institutions.

Smart contract-based financial functions, known as Decentralized Finance, or DeFi, settle in near real-time and are global and transparent by design. This combination both limits friction and mitigates counterparty risk. Further, smart contracts are natively interoperable on a given network, allowing for novel functions to be deployed that take advantage of existing software. This could lead to an ecosystem of cryptoassets that could be used natively for payment, exchange or collateral via decentralized services like lending and exchange marketplaces. Already there are over USD 200 billion of cryptoassets currently under management in DeFi smart contracts.<sup>17</sup> As more volume moves on-chain, ARK’s research suggests that DeFi, and the public blockchains that power it, could take share from the USD 22 trillion global financial services market capitalization.<sup>18</sup>

10 “Debunking Common Bitcoin Myths,” Yassine Elmandjra, ARK Invest, June 2021.  
11 “Bitcoin Inflation,” Woobull Charts  
12 “Bitcoin: Good as Gold?” D. Barrera and S. Minovitsky, May 2021, MSCI; “Bitcoin as an Investment,” Y. Elmandjra, September 2020, ARK Invest  
13 “Bitcoin as an Investment,” Y. Elmandjra, September 2020, ARK Invest  
14 “The Role of Cryptocurrencies in Investor Portfolios,” M. Czazionis et al. March 2021, MIT Sloan School Working Paper 6418-21.  
15 “Introduction to Smart Contracts,” Ethereum.org, Ethereum Foundation  
16 “Blockchain ICO projects: funds raised worldwide 2017-2019,” Shanhong Liu, Statista  
17 DeFi Llama, as of 1/20/22  
18 “Financial Services Market Value Is Expected to Reach \$26521.67 Billion by 2022,” January 2020, The Business Research Company



# Network Infrastructure and Security

Bitcoin's innovation lies in its ability to coordinate trust and facilitate the transfer of value without relying on a centralized authority. The enabler is proof-of-work mining, a mechanism that adds new coins to the money supply and protects the network against nefarious actors' attempts to spend the same coin more than once. Through economic incentives, miners voluntarily secure the network by verifying "blocks" of transactions and appending them to the public ledger. In exchange for providing the processing power that is critical to the network's security, miners are rewarded with newly minted coins and transaction fees. Once dominated by hobbyists, mining has evolved into a hyper-competitive, concentrated multibillion-dollar industry harnessing specialized chip hardware. This "proof of work" protocol thus underpins settlement in a very rigorous way at the acknowledged cost on resources and scalability.

Hence there have been consistent efforts to find a less energy-intensive solution to securing distributed ledgers. Proof-of-stake, the leading alternative protocol, posits that in place of physical capital (mining hardware, energy), networks can be secured by leveraging their native tokens. In proof-of-stake, those wishing to validate transactions and earn the rewards of

new issuance and transaction fees must place a balance of tokens "at stake." In the instance of undesirable activity (censorship of transactions) or inactivity (allowing the server to go offline for an extended period), a validator's stake may be destroyed or reclaimed by the protocol—effectively creating a monetary disincentive to cheat the system.

While some participants, including the founder of Ethereum Vitalik Buterin, suggest that proof-of-stake networks are more expensive to attack than proof-of-work, it should also be acknowledged that in the absence of dependence on physical resources, proof-of-stake systems operate in a "closed loop" and could lead to higher wealth concentration and centralization over time.<sup>19</sup> Nevertheless, Ethereum, the largest smart contract blockchain by "market cap", is planning to transition to proof-of-stake consensus in 2022.<sup>20</sup> Additionally, newer smart contract blockchains, such as Solana and Avalanche, have launched natively with proof-of-stake consensus.

<sup>19</sup> "Why Proof of Stake," Vitalik Buterin, November 2020

<sup>20</sup> "Upgrading Ethereum to Radical New Heights," Ethereum Foundation



## What are the potential risks to this emerging ecosystem?

### Custody

The safekeeping of bitcoin and digital assets is different in key ways from that for fixed income or equities. For example, the possession of digital private keys equates to ownership. But the technical management of private keys requires solutions beyond traditional asset custody. In the last 10 years, the mismanagement of private keys has been estimated to have cost investors hundreds of millions of dollars. Even the largest retail-orientated bitcoin players have suffered from security breaches exceeding USD 800 million in the last two years.<sup>21</sup>

Self-managed custody may suffice for individuals (and the options are much easier to operate than even a few years ago), but fiduciary responsibilities preclude institutional investors from the custody of bitcoin. Under the Securities and Exchange Commission's (SEC) Custody Rule, for example, US institutions should adopt full-service third-party solutions leading to a growing institutional-level ecosystem.

<sup>21</sup> For examples, see p.24 in "Bitcoin as an Investment", Y. Elmandjra, September 2020, ARK Invest

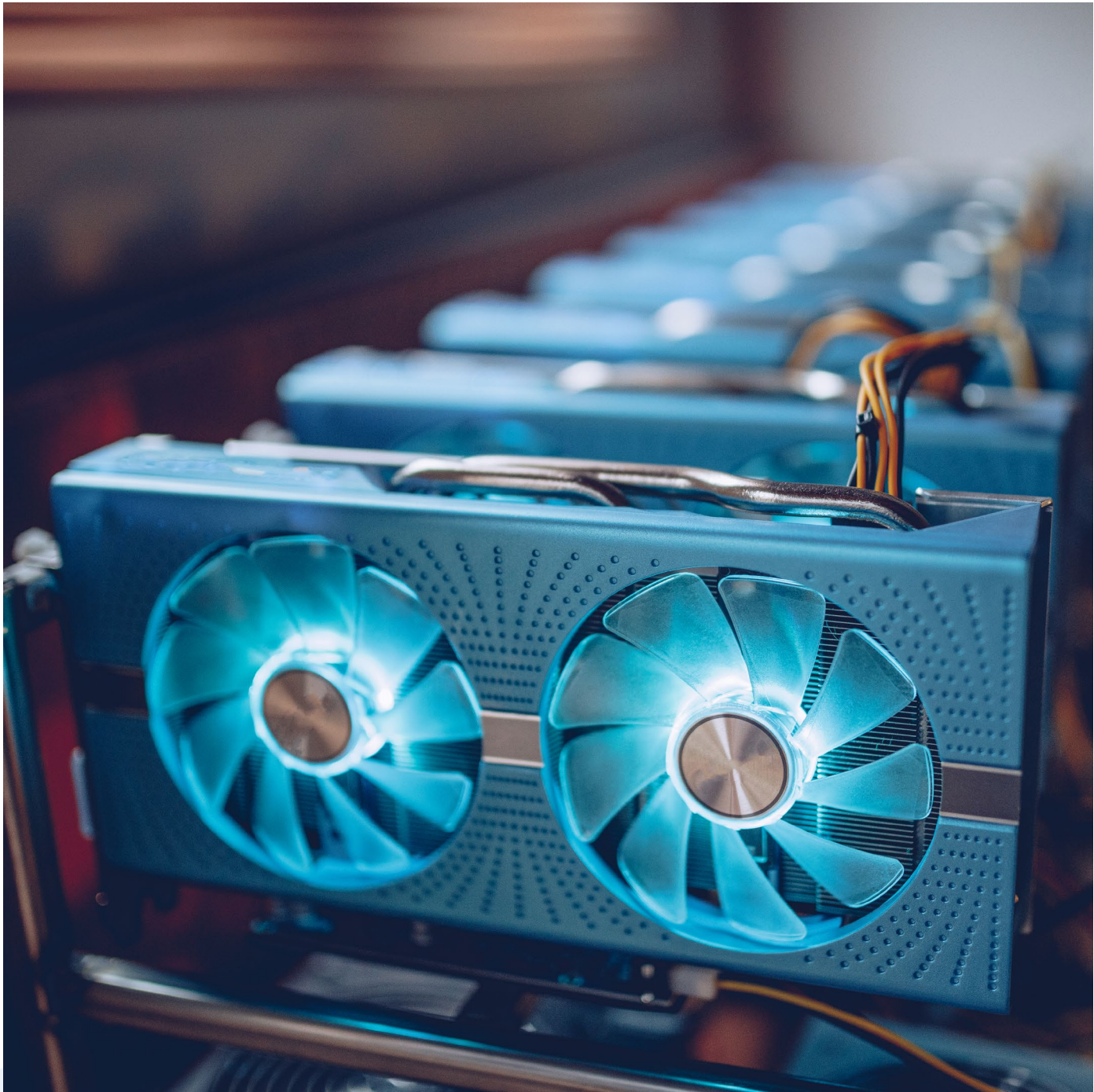


Regulation

One of the appeals of cryptocurrencies is their ability to exchange and store value “permissionlessly.” Regulators are actively and publicly debating how bitcoin can and should be regulated. In principle, as an internet-native asset, cryptoassets like bitcoin should operate without regard to jurisdiction, but in practice, nation-states have acted very differently. Bolivia banned bank and commercial use of cryptocurrencies as early as 2014 and arrested 60 alleged crypto users three years later;<sup>22</sup> while 2021 saw China declare crypto-currency transactions illegal;<sup>23</sup> and India prepared legislation to ban private crypto currencies and introduce an official digital currency,<sup>24</sup> The United States has seen evolving and competing positions from the SEC and CFTC and hearings in Congress,<sup>25</sup> while El Salvador made bitcoin legal tender<sup>26</sup> and Malta created a national regulatory strategy promoting “Virtual Financial Assets” in 2018.<sup>27</sup> The regulatory gap extends from the asset to the infrastructure: in the US, for example, there is no FDIC insurance nor formal depositor rights.

“Over-Institutionalization”

Could institutional adoption undermine bitcoin’s value proposition? That is, if the custody of digital assets becomes dominated by third parties then could this limit the free exchange of value globally and the protected ownership of wealth? Since institutions must custody bitcoin with third party services, a custodial “banking” layer could result in just a few trusted parties dominating transactions. Retail and institutional users drawn to the most cost-efficient solutions could also transact with IOUs instead and thereby save on transaction costs. Already, it has been estimated that more than 2.5 million BTC—13% of bitcoin’s circulating supply—is held in centralized custodial solutions.<sup>28</sup>



22 Bolivia Banned Crypto but Advocates Are Pushing Back - CoinDesk 2020, [https://www.bcb.gob.bo/webdocs/01\\_resoluciones/044%202014.PDF](https://www.bcb.gob.bo/webdocs/01_resoluciones/044%202014.PDF)

23 China declares all crypto-currency transactions illegal - BBC News

24 India to ban private cryptocurrencies and launch official digital currency - The Guardian

25 Crypto CEOs Head to Congress to Fight Looming Regulations. Here's What to Expect (msn.com)

26 Fear and excitement in El Salvador as Bitcoin becomes legal tender - BBC News

27 <https://www.mfsa.mt/wp-content/uploads/2020/12/The-Nature-and-Art-of-Financial-Supervision-Volume-II-Virtual-Financial-Assets.pdf>

28 <https://studio.glassnode.com/metrics?a=BTC&category=&m=distribution.BalanceExchanges>

Conclusions

The debate over the role of cryptocurrencies, like bitcoin, as an alternative asset class and as a catalyst for the disruption of key financial system infrastructure functions, like custody, remains heated. Nevertheless, institutional investors are increasingly bringing a more analytical approach to bear on the case for potential capital allocations and the ways digital assets may allow them to re-imagine their operating platforms and the broader financial ecosystem.

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## Contact us

[clientservice@msci.com](mailto:clientservice@msci.com)

### AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

### EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100+
Frankfurt	49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

### ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

\* = toll free

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